

## Nutraceuticals: An Overview on Food and Health

Nitesh Gupta\* and Dharmendra Singh

Department of Pharmacy, Veer Bahadur Singh Purvanchal University, Jaunpur, India

**Corresponding author:** Nitesh Gupta, Department of Pharmacy, Veer Bahadur Singh Purvanchal University, Jaunpur, India, E-mail: niteshg0688@gmail.com

**Received date:** January 04, 2024, Manuscript No. IPCTN-24-18536; **Editor assigned date:** January 08, 2024, PreQC No. IPCTN-24-18536 (PQ); **Reviewed date:** January 22, 2024, QC No. IPCTN-24-18536; **Revised date:** January 29, 2024, Manuscript No. IPCTN-24-18536 (R); **Published date:** February 05, 2024, DOI: 10.36648/ipctn.9.1.41

**Citation:** Gupta N, Singh D (2024) Nutraceuticals: An Overview on Food and Health. J Nutraceuticals Food Sci Vol.9 No.1:41.

### Abstract

The concept of nutraceuticals evidence-based medicine started from studies conducted in the United Kingdom, Germany and France that concluded consumers place more value on nutrition than exercise or genetics in maintaining their health. Nutraceuticals, a portmanteau of the words nutrition and medicine, is a food or nutritional product that has been shown to provide health and therapeutic benefits, including the prevention and treatment of disease. The term nutraceuticals does not easily fall into the class of food and medicine and often exists in the gray area between these two. Nutraceuticals range from herbal extracts, dietary supplements and nutritional supplements to processed foods and processed products such as cereals, soups and beverages, also known as food products. Nutraceuticals have been shown to have physiological benefits or provide long-term protection against disease. In addition to immunity, they also play an important role in controlling and treating diseases.

Moreover, healthcare professionals have adopted an attractive approach to achieve success in the fight against drugs with "nutraceuticals" as an alternative to everyday drugs. This change will lead us to a new era in medicine and health, where the food industry, just like the pharmaceutical industry, will be science-oriented. This article focuses on nutraceuticals definition, history, growth, distribution, challenges and opportunities, regulations and motivation behind nutraceuticals development.

**Keywords:** Nutraceuticals; Classification; Traditional and non-traditional nutraceuticals; Fortified; Recombinant nutraceuticals

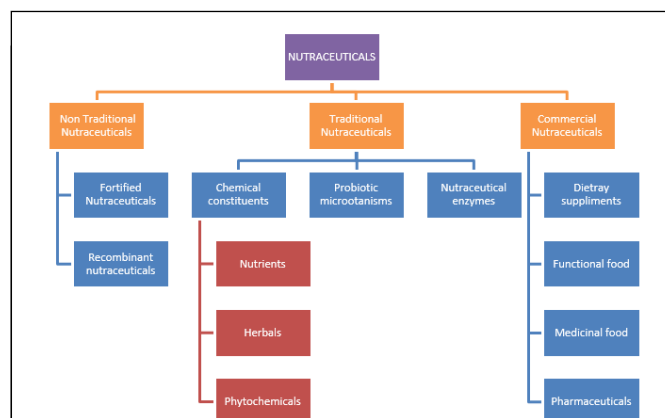
### Introduction

The connection between food and health was established long ago. Hippocrates once said, "Let food be the medicine and medicine be the food". Medicines in Europe, Asia, Africa and pre-Columbian America include foods used to prevent and treat disease. However, under the influence of rationalist Western medicine, food is viewed primarily as a source of nutrients (e.g., energy, protein and fat) to the exclusion of other uses. However, as demographic changes increase the prevalence of chronic

diseases, there is growing evidence that food products made with natural ingredients can be sustainable and treat many of the most difficult health problems. The term is a combination of the words diet and medication. Nutraceuticals were coined in 1989 by Stephen L Defelice, founder and president of the Foundation for Innovative Medicine. Nutraceuticals are products derived from foods that claim to provide health benefits in addition to the nutrients in food that provide protection against diseases. Thus, nutritional is a product that can be considered food or part of food and that provides medical or health benefits, including prevention and treatment. Such products can range from individual foods, nutritional supplements and foods to processed foods, herbs and foods such as cereals, soups and drinking water. Here are some examples of medicinal plants used as food and medicine for infections, to improve the immune system and even for many diseases. Northeast India is rich in diversity. The tribes of the East followed the principles of Hippocrates. They use food as medicine. The chicken vine (*Rubiaceae*) is one of the plants. One study determined its gastro protective and antioxidant activity. According to Ayurveda, garlic, onion and ginger are the basis of all good foods. Garlic is one of the best ingredients for health. These are considered food, spices and medicine.

### Classification of Nutraceuticals

Nutraceuticals are non-specific biological therapies used to promote wellness, prevent malignant processes and control symptoms. They are classified as follows **Figure 1**.



**Figure 1:** Classification of nutraceuticals.

## Nutrients

Nutrients are vitamins, minerals, amino acids and fatty acids that makeup food. Most vegetables, whole grains, dairy, fruits and animal products (such as meat and poultry) contain vitamins that may help with heart disease, stroke, cataracts, osteoporosis, diabetes and cancer. It contains minerals in plants, animals and dairy products that can be used to improve bones and diabetes, strengthen bones, teeth and muscles and improve blood flow and heart rate. Flaxseeds and salmon contain the fatty acid omega-3 PUFA, which regulates the inflammatory process, regulates brain function and lowers cholesterol [1].

The most beneficial nutrients are antioxidants, water and fat-soluble vitamins. Many potential benefits are associated with using antioxidants in foods or supplements. Overall, antioxidants may help prevent cancer and cerebrovascular disease. A diet rich in vitamin E may protect against Parkinson's disease.

## Herbals

Plants are as old as human civilization and are used to treat acute and chronic diseases. Knowledge of medicinal plants has been collected over thousands of years, so today we have a variety of ways to provide healing (Stauffer, 1999). Nutraceuticals promise to use herbs to improve health and prevent chronic diseases. For example, willow bark (*Salix nigra*), which contains salicin as its main ingredient, has anti-inflammatory, analgesic, antipyretic, astringent and anti-arthritis effects. Parsley (*Petroselinum crispum*) contains flavonoids (apiosol, psoralen) that have diuretic, carminative and antipyretic properties. Peppermint (*Mentha piperita*) contains menthol as an active ingredient used to treat colds and flu. Lavender (*Lavandula angustifolia*) contains tannins that help treat depression, high blood pressure, depression, colds, coughs and asthma. Cranberries (*Vaccinium erythrocarpum*) contain proanthocyanidins, which have been shown to be effective in treating cancer, ulcers and urinary tract infections [1].

## Phytochemicals

They are classified as phytochemicals. Carotenoids (isoprenoids) are found in vegetables and strengthen the immune system, especially the killer cells responsible for immunity. Legumes (chickpeas and soybeans), grains and palm oil contain non-carotenoid substances that remove cholesterol and have anti-cancer properties. Flavonoids are a class of secondary metabolites found in most plants. More than 4,000 species have been recognized for use in the treatment of various diseases such as cancer, diabetes, heart disease and kidney disease.

Phenolic acids are one of the largest classes of secondary metabolites and are found mainly in citrus fruits and red wine. They have antioxidant properties in eliminating free radicals produced by many metabolic pathways such as proteins, carbohydrates and fats. It also has anti-cancer properties. Antitumor activity a classic example is curcumin (turmeric). It is used as a phytochemical in most cuisines.

## Dietary supplements

Dietary supplements are oral devices that contain nutrients designed to supplement the foods you eat. According to the definition of the Dietary Supplement Health and Education Act (DSHEA, 1994), a product that contains one or more of the dietary ingredients such as vitamin, mineral, herb or other botanicals and amino acid (protein) also includes any possible component of the diet as well as concentrates, constituents, extracts or metabolites of these compounds, as their ingredients, extracts or metabolites. Examples of dietary supplements include black cohosh for menopause symptoms, ginkgo for memory and glucosamine/chondroitin for arthritis. They also offer specialties such as sports nutrition, weight loss products and meal replacements. Additional ingredients may include vitamins, minerals, herbs or other plants, amino acids, enzymes organ tissue, secretory extracts or other nutrients. They are available in various forms such as tablets and capsules, liquid, powder, extract and concentrate.

## Probiotic microorganisms

Mechnikov coined the term probiotics, its use is well supported in today's medicine as it can make the intestines more efficient for processes such as absorption and metabolism. Probiotics are very important to make life better by destroying bacteria in the intestine. It is important for intestinal bacteria and maintaining a good environment, for example *Bacillus bulgaricus*. There are currently many probiotic products on the market that contain enough nutrients to kill many bacteria and thus can treat many human diseases.

Antibiotics often cause a change in the microbial community, making the epithelial tissue stronger and creating conditions for better old storage of additional products needed by the body. Additionally, probiotics are effective in lactose intolerance by producing enzymes (beta-galactosidase) and hydrolyzing lactose into sugar products.

## Nutraceutical enzymes

Enzymes are protein structures produced by cells and serve as biological substances can reduce metabolism and make life run faster. Most medical problems related to the gut, such as GERD (Gastroesophageal Reflux Disease) or constipation, diarrhea or ulcerative colitis, can be treated with enzyme supplements. Enzyme may be a better choice for diabetics. Today, enzyme therapy is used in the treatment of many rare diseases such as Gaucher disease, hunter disease, fabry disease and pompe disease. Although enzymes are produced by their own cells, microbial sources are preferred because they are more economical than plants and animals. Enzymes are protein structures produced by cells and serve as biological substances can reduce metabolism and make life run faster. Most medical problems related to the gut, such as GERD or constipation, diarrhea or ulcerative colitis, can be treated with enzyme supplements. Enzyme may be a better choice for diabetics. Today, enzyme therapy is used in the treatment of many rare diseases such as gaucher disease, hunter disease, fabry disease and pompe disease. Although enzymes are produced by their

own cells, microbial sources are preferred because they are more economical than plants and animals.

### Fortified nutraceuticals

These types of nutraceuticals includes selection or addition at the agricultural level. Nutrients compatible with key ingredients such as flour rich in minerals, calcium and iron added to grains, milk rich in folic acid and cholecalciferol. Commonly used for vitamin D deficiency.

### Recombinant nutraceuticals

Energy-providing foods, such as bread, alcohol, fermented starch, yogurt, cheese, vinegar and others are produced with the help of biotechnology. The production of probiotics and the extraction of bioactive components by enzyme/fermentation technologies as well as genetic engineering technology are achieved through biotechnology.

### Medicinal food

Medicinal food a food which is formulated to be consumed or administered internally under the supervision of a physician and which is intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements, based on recognized scientific principles are established by medical evaluation also without any components that promote disease conditions or contain a specific nutrient that the body cannot normally produce due to specific disease conditions. It is prescribed by physicians for various health conditions that lead to impaired ingestion, digestion, absorption or metabolism of traditional foods like phenylketonuria, coeliac disease and lactose intolerance.

### Functional foods

Functional foods are, by definition, foods or foods that provide health benefits in addition to the nutritional value they contain. Foods Study aims to assist consumers by eating foods that are close to their own. Expanding on the situation, nutritious foods are made strong or potent, which the process is called nutrition section this method can, in some cases, restore the nutrients in the food to be similar to the product before the food was completed by adding additional nutrients such as Vitamin D from the food dairy cattle.

### Pharmaceuticals

Nutraceuticals are pharmaceutical products having bioactive phytochemical or zoo chemical agents which are used in enhancing health in dosages and are going beyond normal foods today [2].

## Market Trends of Nutraceuticals

According to the additional report, nutraceutical manufacturers are viewing developing countries such as India and China as growth regions as the market is close to growth and per capita consumption of nutraceuticals is very high. In

addition to India's currently low per capita cost for these products, other factors that will support the growth of nutraceuticals in India include rising obesity in the population and rising blood pressure, diabetes and heart disease, the report said. Due to India's food safety concerns and need for nutritional supplements, the government is also funding a vitamin supplement programs [3].

## Rationale for use of Nutraceuticals

Nutrition plays an important role in the early onset of chronic diseases, disease progression, morbidity and mortality. Approximately 40%-50% of heart disease, 35%-50% of cancer and 20% of osteoporosis can be attributed to diet. The use of food as medicine in the treatment and prevention of various diseases is not a new development. Fortification of table salt with iodine and fortification of wheat flour with iron/folic acid has long been used to prevent iodine deficiency goiter and anemia. Similarly, foods fortified with vitamin A have been shown to be a feasible and effective way to reduce vitamin A deficiency [3].

## Nutraceutical Regulations

Health policy aims to protect the health of consumers, develop essential businesses, participate in health and promote fair trade in food within and across countries. There are two clear challenges for the nutraceutical industry: Regulatory uncertainty and reliability of application. The food industry in India is subject to various mutually exclusive laws enacted at different times [1].

Regulations change from country to country. Japan was the first country to treat food as a separate category and introduced the FOSHU (Food for Specified Health Uses) system to measure health in 1991. This process is very effective: It regulates safety and health and requires food to be analyzed for its beneficial properties (Sohaimy, 2012). The Health and Dietary Supplements Association of India was formed to represent the pharmaceutical, nutraceutical, herbal, direct selling and other service industries and plans to join the International Federation of Dietary Supplement Associations in the future. The organization organizes scientific meetings to bring together industry and government to share knowledge, experience and views on the use and management of nutrition. Following pressure from industry and stakeholders for a single regulator and modern food laws, the Government of India (GOI) enacted the Food Safety and Standards Act (FSSA), in 2006 after extensive consultation and legislative process [1,4].

## Research and Development

The greatest scientific need in nutraceuticals pertains to standardization of compounds and/or products, to carefully develop and execute clinical studies/trials to provide the basis for health claims for nutraceuticals that impact consumers as well as companies making strategic investments. Powerful market forces are fueling the interest in Nutraceuticals [5]:

- Rapid advances in scientific knowledge supporting the vital role of diet in health and disease prevention.
- Skyrocketing health care costs.
- Skyrocketing health care costs.
- An aging population.
- Technical advances in the food industry that are allowing the development of health promoting foods that can be marketed to health-conscious consumers at a premium.
- The changing regulatory environment.

## Role of R and D in Nutraceuticals

- To test safety, purity and potency of products.
- To develop more effective and efficient means of producing ingredients for use in products.
- To develop testing methods for ensuring and verifying the consistency of the dosage of ingredients included in the company's products.
- Develop the new products either by combining existing ingredients used in nutritional supplements or identifying new ingredients that can be used in nutritional supplements [5].

## Nutraceuticals and its Impact on Health Care

### Polyunsaturated Fatty Acids (PUFA)

Human body is capable of synthesizing most of the fatty acids it needs except the two major polyunsaturated fatty acids, *i.e.*, omega-3-fatty acid and omega-6-fatty acids. These fatty acids are required to be supplemented from the diet. The polyunsaturated fatty acids are the known precursors for Arachidonic Acid (AA), Eicosapentaenoic Acid (EPA) and Docosahexanoic Acid (DHA). These fatty acids have been found to regulate blood pressure, heart rate, blood clotting and immune response. Omega-3-fatty acids have been reported to be important fatty acids in the prevention of heart diseases and also in the treatment of arthritis. Omega-3 fatty acids are mostly found in cold water fishes such as tuna, salmon and mackerel. It is also present in dark green leafy vegetables, flaxseed oil and in certain vegetable oils. The fatty acids such as AA and DHA are essential for the development of the foetus and also during the first six months after birth. The deficiency of these fatty acids may result in poor development of foetus and may also cause a variety of problems such as premature birth to underweight babies. Breast milk is a very rich source of DHA. Most of the infant formulas which are used as a substitute of breast milk should be supplemented with DHA, as per the recommendation by World Health Organization [4].

Large number of elements control variety of physiological and biochemical functions of human body. Most of these minerals are provided through the diet but their deficiency in diet may develop variety of health related problems and diseases [6].

**Calcium:** Calcium is an important element in the treatment of decalcification of bone. Calcium deficiency is found in 25% of women, even though much higher percentages have osteopenia

or osteoporosis. Pre-puberty is the best time to begin supplementing the diet with calcium rich minerals along with exercise regimen. Sufficiently intake of calcium and vitamin D post-menopausal can significantly reduce the risk for fracture.

**Magnesium:** Magnesium is an essential element involved in various enzymatic processes and critical in the proper use and maintenance of calcium. Many individuals with calcium deficiency are actually magnesium deficient which prevent proper use of calcium.

**Manganese:** Manganese is required in several enzymatic reactions and necessary for proper bone and cartilage formation.

**Boron:** Boron is reported to be helpful in supporting the calcium and estrogen level in post-menopausal in women.

**Copper:** Copper is an essential element needed by all tissues in the body. Copper and Zinc must be in proper formation. Copper is best absorbed when bound to an amino acids.

**Zinc:** Zinc is one of the most important trace mineral. Zinc supports the bodies overall antioxidant system by scavenging free radicals. It also perform many other vital functions.

**Phosphorous:** Phosphorous important in maintaining bone structure and modulating plasma and bone formation.

**Silicon:** Silicon is concentrated in the active growth areas of bone. It influences both for bone formation and calcification.

### Probiotics

Probiotics (for life) can be described as a living microorganism which when ingested with or without food improves the intestinal microbial balance and consequently the health and functioning of large intestine. The major sources are the cultured dairy products such as natural cheese, yogurt, kefir and butter milk lactobacillus also in green foods such as wheat grain, spirulina and chlorella. There are over 400 different bacteria living in the human GI tract, of all these lactobacillus acidophilus is one of the major component of the probiotic fighter. It enhances the immune system. *Lactobacillus acidophilus* can reduce the incidence of vaginal infections including thrush and bacterial vaginosis. Bifidobacteria and *Streptococcus thermophilus* both found in yoghurt can prevent young children suffering from diarrhea also in treating travelers' diarrhea and rotavirus infection. Probiotics only have a transient effect and regular daily intake is needed to bring about health benefits. Probiotics gaining importance against helicobacter pylori infection, colonic cancer, irritable bowel syndrome, pancreatitis, antibiotic induced diarrhea, Crohn's disease and pouchitis. Probiotics are food components that escape digestion by the normal human digestive enzymes and safety in intact form, reach the colon after passage through the stomach and small intestine where they selectively promote the growth of probiotics. Fructo-Oligo Saccharides (FOS) are increasingly used as food supplements. FOS have more long-lasting effect as they encourage the growth of Bifido bacteria already present in the gut. At least 10 gm FOS is needed daily [6].

## Single Cell Protein (SCP)

The mass production of bio protein from the single-cell organism like bacteria or fungi termed as microbial biomass or Single Cell Protein (SCP). *Sacchromyces cerevisiae* were first established for the production of single cell proteins. The biomass were utilized in the forms of soups and sausages. Single cell proteins has more nutritive value than the normal living cells. An ideal biomass consist of the components such as carbohydrates, proteins, vitamins, lipids and trace amount of mineral and salts [6].

## Spirulina

Spirulina plankton is a blue green vegetable micro algae is a good example of single cell protein. In India, research work is in progress at Central food Technology Research Institute, Mysore on spirulina to develop some single cell proteins as a supplement to food. Spirulina, which is the only natural source providing the highest amount of protein known to man that is, 71% and it is three times that of soyabean and five times that of meat. It contain proteinous nitrogen (11.36%), total organic nitrogen (13.35%), nitrogen from nucleic acid (1.9%), lipid content is (5%-6%), having more essential fatty acid (Vitamin F) composed of oleic, linoleic, gamma linoleic, palmitic, palmitoleic, heptadecanoic acids. About 40% of the fats include glycolipids including sulpholipids (2%-5%) which have significant anti-HIV activity. Spirulina contains the carbohydrate in the form of glycogen and rhamnose. Because of the presence of B-carotene with 9-Cis-carotenoid isomer, it has more antioxidant activity. The mineral content (3%-6%) mainly includes iron which has better absorption than natural iron. The better absorption is due to its soluble complexes with phycocyanin which is protein derived from algae having the linear tetra pyrrole *viz* phycocyanobilin and resembles haemoglobin. Phycocyanin enhances general immunity and useful in lymphocytic activity against cancer. The enzyme content in spirulina is in the form of super oxide dismutase and it is known of its free radical scavenging effects and plays vital role in pathophysiological conditions like atherosclerosis, arthritis, cataract, diabetes and also in emotional stress and aging process. Gamma linolenic acid of spirulina helps to reduce cholesterol levels. It has appetite suppressing activity. Water extract of spirulina inhibits HIV-1 replicatoin in human derived T cell lines and in human peripheral blood mono nuclear cells. Like all other microbial cells, spirulina contains all natural vitamins, B complex, minerals and other growth factors. Vitamin B<sub>12</sub> can be utilized only from vegetable source. The World Health Organization has found spirulina has an excellent food for human consumption. Spirulina is FDA approved food supplement and can be marketed in USA as a natural food.

## Discussion

### Challenges and opportunities

A huge number of challenges in the growth of nutraceuticals are still faced by India, due to the lack of awareness among Indian consumers about the use and ability of conventional

nutraceutical ingredients. Methods for their handling and measurement are lacking as most of the bioactive phytochemicals are still under investigation [7]. The Government regulatory bodies also face challenges in this new category of health products. The safety and efficiency of nutraceuticals need further research. There is often confusion in nutraceuticals and functional foods, as it is lumped together with the field of biotechnology and genetic modification [2].

### Current nutraceutical scenario

In today's world, chronic diseases are spreading at an alarming rate and food products are emerging as solutions to these health problems. The global nutraceutical industry has grown significantly over the last two decades and has now reached a multi-billion dollar industry size [7]. This growth is also seen in the nutraceutical industry in India. The richness of India's international R&D facilities, human resource knowledge and raw material diversity put our country in an important position. In India, modern nutraceuticals emerged with the spread of Ayurveda, the ancient Indian medicine. Since its inception, Ayurveda has promoted the use of Chyavanprash as well as botanicals such as Ashwagandha and ternary herb, which are powerful ingredients designed to improve or maintain one's health and immunity. Since immunity has become an emergency in the age of COVID-19, almost everyone has started to buy and invest in herbal or antiviral drugs. Therefore, to promote immunity, many famous brands like Mother Dairy, a Delhi-NCR-based dairy product, have launched haldi dhoodh or turmeric milk. There are also combinations that include broccoli, spinach, bell pepper, garlic, dark chocolate, lemon, parsley, cinnamon and all the key ingredients of the period. The market is growing with many new products being introduced every day. In addition, GlaxoSmithKline Consumer Healthcare, Dabur India, Cadila Healthcare, EID Parry's, Zandu Pharmaceuticals, Himalaya Herbal Healthcare, Amway, Sami Labs, Elder Pharmaceuticals and Ranbaxy are some of the important nutraceutical companies in India [2].

### The future of nutraceuticals

The expansion of the nutraceutical industry shows that end users are seeking minimally processed foods with added nutritional value and benefits. This development also leads to the expansion of the global nutraceutical market. The emerging nutritional food industry appears destined to dominate the new millennium. Their great development has affected food, medicine, medicine and agriculture. Enzymes have been underemployed they are going to be a hot area in the future. The use of microbial fermentation systems to create new foods also represents a possibility. The global trend in healthy foods is irreversible. Companies are taking the initiative and making strategic investments in science, product development, marketing and consumer education that will not go to waste. Nutraceuticals delivered *via* oral or transdermal delivery can provide health benefits and optimal bioavailability. Information about an individual's genetic profile should also be relevant to specific nutritional interventions. This would be a tremendous improvement over current dietary recommendations, which are

reported to be so general that they only benefit 60% of the population [4,8].

## Conclusion

The nutraceuticals industry is growing faster than the food and pharmaceutical industries. Health authorities consider prevention and treatment as an important aspect of health care and the prevention of food poisoning due to disease and chronic diseases, thereby promoting good health and good living. Future demand for Nutraceuticals depends on consumers' perception of the relationship between diet and disease. Although nutraceuticals hold significant promise for improving human health and preventing disease, healthcare professionals, nutritionists and healthcare professionals must work together to craft the necessary policies to provide people with optimal health and treatment.

Many foods, fruits and vegetables contain nutrients that are beneficial to health. There is evidence for the effects of natural products on many biological processes, including activation of antioxidant defenses, signaling pathways, gene expression related to cell survival, cell proliferation and differentiation and maintenance of mitochondrial integrity. It seems that this product will play an important role in preventing various age-related diseases or pathologies of chronic diseases.

To gain scientific knowledge about Nutraceuticals, public learning and daily consumption of Nutraceuticals must be approved and known by all consumers. Nutraceutical products result from joint research in the pharmaceutical, food and chemical industries. As the healthcare industry grows in India,

the growth of Nutraceuticals also continues to increase as people want to treat diseases by improving their health with the help of quick medical supplies. Now nutraceuticals a day may keep the doctor away replace the old proverb an apple a day will keep the doctor away. Consumers are turning massively to food supplements to improve wellbeing where pharmaceuticals fail.

## References

1. Chanda S, Tiwari RK, Kumar A, Singh K (2019) Nutraceuticals inspiring the current therapy for lifestyle diseases. *Advances in pharmacological sciences*.
2. Pragya K (2020) Nutraceutical conundrum: A new challenge.
3. Bhowmik D, Gopinath H, Kumar B, Duraivel S, Kumar KS (2013) Nutraceutical: A bright scope and opportunity of Indian healthcare market. *Pharm Innov* 1: 13.
4. Kumar K, Sarvesh K (2015) Role of nutraceuticals in health and disease prevention: A review. *South Asian J Food Technol Environ* 1: 116-121.
5. De Busk Ruth (2021) Functional food, vegetarian nutrition.
6. Rathod MV, Mahadik M, Hingane LD (2021) Nutraceuticals and its impact on health care. *Int J Res Appl Sci Eng Technol* 9: 1364-1373.
7. Borkar N, Saurabh SS, Rathore KS, Pandit A, Khandelwal KR (2015) An insight on nutraceuticals. *Pharma Tutor* 3: 13-23.
8. Pandey M, Verma RK, Saraf SA (2010) Nutraceuticals: New era of medicine and health. *Int Multidiscip Res J* 3: 11-15.